

**DARPA R&D Annual Report ( June 1997-June 1998)**

**DARPA Order No.:**

**Contract No:** N00014-96-C-0145

**Effective Date of Contract:** June 26, 1996

**Expiration Date of Contract:** June 30, 2000

**Contractor:** General Electric Corporate Research and Development

**Principal Investigator:** James A. Cella

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**Short Title of Work:** Non-toxic, Self-cleaning Silicone FR Coatings

**The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the Defense Advanced Research Projects Agency of the U.S. Government.**

The tasks accomplished to date include preparation of 387 panels undergoing preliminary exposure testing at FIT and Miami Marine Research and Testing Station; preparation of 204 downselected panels for exposure at Bridger Scientific, FIT, SUNY Buffalo and the University of Hawaii; preparation and initial evaluation of 17 downselected panels for hydrofoil testing at FIT; deployment of 1 set of bilge keel panels; patch tests on the USS Nevada; and the first of two large scale validations.

Statistical analysis shows clear performance differences between downselected coatings. Coatings have been analyzed based on coverage, barnacle, oyster, tubeworm and snail adhesion values, and water jet removal of slimes and hard fouling. Although nearly all coatings have improved performance relative to RTV11, 4 of the downselected coatings show substantially reduced adhesion values. The top performers have been applied to bilge peel panels and test patches. Hydrodynamic drag testing has been performed on several of the downselected coatings.

Experiments have been initiated to reduce the complexity of the application process by elimination of the mistcoat layer between the epoxy and the elastomeric tielayer. Peel adhesion testing of coating systems with the amended epoxy coating show comparable adhesion values and a greater percentage of cohesive failure in the tielayer to systems containing the mistcoat. Spray application of 3 of the top 4 compositions has been

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July 13, 1998

TO: Steve Wax  
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Director, Naval Research Laboratory  
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Enclosed is the DARPA R&D Annual Report for June 1997 through June 1998, Contract No. N00014-96-C-0145.

If you have any questions, please call me.

Sincerely,

J. A. Cella, Manager  
Copolymer Technology Program

cc: B.J. Malloy

demonstrated. Pre-exposure surface analysis was conducted on all downselected compositions.

Environmental studies have been completed for compositions containing radiolabeled polydimethylsiloxane and polydimethyldiphenylsiloxane oils. Insignificant amounts of oil have leached from these compositions during the one year test period. Studies are ongoing with other oils.

All coatings have been analyzed at SPAWAR Systems Center for toxicity against the mysid shrimp and inland minnow . Samples from the first downselect have also been analyzed for toxicity against chain diatoms. RTV11 has a higher toxicity than the more promising candidates from the first and second downselect sets.

The first of two large scale validations was performed on a pleasure craft at FIT. The boat was painted with epoxy, mistcoat, tielayer, and the best performing topcoat on the starboard side and with amended epoxy, tielayer, and the best performing topcoat on the starboard side.